REMARKS

Claims 1 - 18 and 34 - 36 are pending. Claims 6, 9, 13, 17, and 18 have been amended. Claims 34 - 36 has been added. Claims 19 - 33 have been cancelled, without prejudice. No new matter has been introduced. Reexamination and reconsideration of the application are respectfully requested.

Applicants confirm a telephone provisional election, made without traverse, of Group 1 claims, 1- 18, directed to the invention of a radiation source, made by Roger Wise on December 12, 2002. Thus, Applicants cancel claims 19 - 33, without prejudice.

In the December 20, 2002 Office Action, the Examiner rejected claims 6, 17, and 18 under 35 U.S.C. § 112, second paragraph, as being indefinite. The Examiner rejected claims 1, 12, and 13 under 35 U.S.C. § 103(a) as being obvious over U.S. Patent No. 6,086,942 to Carden Jr. et al. (the Carden reference), in view of U.S. Patent No. 4,676,193 to Martin. (the Martin reference). The Examiner rejected claims 2 - 11, and 14 - 18 under 35 U.S.C. § 103(a) as being obvious over the Carden reference, in view of the Martin reference, and further in view of World Intellectual Property Organization Published Patent Application WO 01/84560 to Petersen et al. (the Petersen reference). These rejections are respectfully traversed.

Applicants have amended claims 6, 17, and 18 to better define the subjected matter the Applicants claim as the invention. Thus, Applicants respectfully submit that the 35 U.S.C. § 112, second paragraph rejection is overcome.

The present invention relates to a radiation flood source for nuclear imaging equipment that is lightweight or flexible and minimizes radioactive waste when

replacement is necessary. The radiation flood source may include a radioactive deposit contained on an inner substrate, where the inner substrate is located in an outer housing. The housing may be thin and made of a radiotranslucent material such as aluminum or plastic. The substrate may have a front surface where the radioactive deposit is deposited to achieve a desired activity pattern. The substrate is attached to the housing by a variety of adhesion methods. The activity pattern may be uniform across the entire surface of the substrate, may mimic an implanted radiation emitter, or may be drawn to match a specified intensity. The substrate, which may be radiopaque, may be a flexible sheet of paper, plastic, or some other material. The surface of the substrate upon which the radioactive deposit is deposited may be covered by a sealing layer, such as a layer of plastic or a polymer. The sealing layer may be radiotranslucent and may be applied by heating, immersion, painting, or spraying. The radioactive deposit may be in the form of a solution, which contains dissolved radioisotope, a solvent, and a binding agent. The solvent may be inorganic or organic, or the solution may be created by dissolving a salt formed from the radioisotope in the solvent. The radioisotope may be adsorbed or chemisorbed to a particular carrier dispersed throughout the solution. The deposited solution may contain a radioisotope precursor. The solution may contain a binding agent, such as an organic resin or an inorganic binding agent. The solution may contain a colorant. The outer housing may include a border, which may include handles or features to allow the handling of the source more convenient. The border may be radiopaque so as to minimize radiation emitted into the hands of personnel maneuvering the source during calibration procedures. The outer housing may be opened so that the substrate with the deposited

radioisotope may be removed.

Claim 1 recites:

1. A radiation source comprising:

an outer housing having a fastener, said outer housing configured to be opened;

a *substrate removably contained within said outer housing*, said substrate having a first surface; and

a radioactive fixedly deposited upon said front surface, said radioactive deposit having a radioisotope.

The Carden reference is directed to the deposit of a predetermined amount and pattern of a radioactive fluid onto a surface of a substrate from an ink-jet printhead. *(Col. 2, lines 42 - 45.)* Drops of a material, whether radioactive or a radioactive precursor, are deposited on the surface of a brachytherapy source. A substantially radiation transparent sealing layer may be applied over the radioactive material-coated brachytherapy support element. The brachytherapy support element may be a hollow two-walled brachytherapy seed which has an outer tube and an inner tube, where the inner tube is attachably secured to an outer tube. *(Col. 7, line 53 - col. 8, line 31.)* Fig. 4a illustrates an inner tube 201 with lumen 202 and radioactive material 203 deposited along the length of the outer surface 200 of the inner tube 201 as a series of discrete drops. An outer tube 204 and a space that lies between the inner tube 201 and the outer tube 204. A welded end 206 is shown sealingly joining inner tube 201 and outer tube 204. *(Col. 12, lines 34 - 52.)* In an embodiment, a radioactive material may be applied to the surface of a surgical suture. The strand may be implanted as a surgical suture or cut into sections and implanted as are seeds. The strands can be made of

plastic or of a biodegradable plastic. Fig. 9 illustrates a strand core 723 with a layer of radioactive material 702 and a protective coating 724. *(Col. 20, lines 30 - 50.)* In an embodiment of the invention, a radioactive material may be applied to a sheet of plastic material. The sheet may be positioned at the end of a surgical margin following removal of a malignant tumor in order to kill remaining cancer cells. Fig. 12 illustrates the sheet embodiment and the sheet includes a supporting layer 1039, a layer of printed isotope 1040, and a protective layer 1024. *(Col. 21. lines 44 - 65.)*

The Carden reference does not disclose, teach, or suggest the radiation source in claim 1. Unlike the radiation source in claim 1, as amended, the Carden reference does not show a radiation source having *an outer housing having a fastener, said outer housing configured to be opened*; a *substrate removably contained within said outer housing*, said substrate having a first surface; and a radioactive fixedly deposited upon said front surface, said radioactive deposit having a radioisotope.

Instead, the Carden reference only discloses a radiation source with an inner tube having a radioactive material deposited a length of the outer surface of the inner tube that is sealingly joined to an outer tube at a welded end with a space in between. *(Col. 12, lines 35 - 52.)* The Carden reference is not found to disclose that the *outer tube may be opened, that the outer surface has a fastener, or that the substrate is removably contained within said outer housing*. The Examiner acknowledges that the Carden reference does not mention use of a fastener attached to an outer housing. *(Dec. 20 Office Action, page 4, 2nd paragraph.)* The Carden reference makes no mention of a radiation source having *an outer housing having a fastener, said outer housing configured to be opened*; a *substrate removably contained within said outer*

housing, said substrate having a first surface; and a radioactive fixedly deposited upon said front surface, said radioactive deposit having a radioisotope. Accordingly, applicant respectfully submits that independent claim 1 distinguishes over the Carden reference.

The Martin reference does not make up for the deficiencies of the Cardin reference. The Martin reference is directed to a stabilized mask assembly for direct deposition of a thin film pattern on a substrate wherein the mask is dimensionally stabilized at the operating temperature of a vapor deposition process. *(Col. 2, lines 54 - 59.)* A substrate holding means is adapted to have a channel 208 located therein which receives and supports a heating element 202 formed in a spiral format therein. Fasteners 210 and 212 are utilized to fasten the substrate heating means 200 to the substrate holding means 140 through tapered hole arrangements. Spring washers 214 are provided between the fasteners 210 and 212 and heating element clamping plate 204 to permit the heating element 202 to expand and contract during the heating thereof. *(Col. 15, line 64 - Col. 16, line 5; Fig. 14.)*

The Martin reference does not disclose, teach, or suggest the radiation source in claim 1. Unlike the radiation source in claim 1, the Martin reference does not show a radiation source having *an outer housing having a fastener, said outer housing configured to be opened*; a *substrate removably contained within said outer housing*, said substrate having a first surface; and a radioactive fixedly deposited upon said front surface, said radioactive deposit having a radioisotope.

Instead, the Martin reference discloses fasteners to fasten a substrate heating means to the substrate holding means through tapped hole arrangements. *(Col. 15,*

line 64 - Col. 16, line 6.) The Martin reference makes no mention of a radiation source having *an outer housing having a fastener, said outer housing configured to be opened.* Applicants understand the Examiner's use of the Martin reference to inherently show the use of screws to make the substrate holding means configured to be open, but this is not the same as a radiation source comprising: *an outer housing having a fastener, said outer housing configured to be opened.* Accordingly, applicants respectfully submit that independent claim 1 distinguishes over the Martin reference, alone or in combination, with the Carden reference.

The Petersen reference does not make up for the deficiencies of the Carden and the Martin references. The Petersen reference is directed to a radiation flood source for quality testing and assurance of radiation detecting devices. *(Page 1, lines 3 - 5.)* A radiation flood source includes a flat substrate having on at least one surface thereof a radioactive coating, wherein the coating comprises a radioactive material and provides for a homogenous and controlled inhomogeneous radiation field. The radiation flood source may further include a protective coating to seal the substrate and its radioactive coating *(Page 4, lines 8 - 14.)* The substrate is preferably made from an electrically not conductive material. The radioactive coating comprises a colored ink. The radiation flood source may be any desired shape and dimension although circular or rectangular shapes are preferred. The radiation flood source protective coating uses any radiation transmitting, but radiation resistant material is desired. *(Page 6, line 3 - page 8, line 15.)*

The Petersen reference does not disclose, teach, or suggest the radiation source in claim 1. Unlike the radiation source in claim 1, the Petersen reference does not

show a radiation source having *an outer housing having a fastener, said outer housing configured to be opened*; a *substrate removably contained within said outer housing*, said substrate having a first surface; and a radioactive fixedly deposited upon said front surface, said radioactive deposit having a radioisotope.

The Petersen reference only discloses a flood radiation source including a coating of radioactive material and an additional protecting coating. *(Page 4, lines 8 - 14.)* The Petersen reference is not found to disclose any housing and makes no mention of a radiation source having *an outer housing having a fastener, said outer housing configured to be opened*; a *substrate removably contained within said outer housing*, said substrate having a first surface; and a radioactive fixedly deposited upon said front surface, said radioactive deposit having a radioisotope. Accordingly, applicants respectfully submit that claim 1 distinguishes over the Petersen reference, alone or in combination, with the Carden and Martin references.

Independent claims 17, 18, and 34 recite limitations similar to independent claim 1. Accordingly, applicant respectfully submits that independent claims 17, 18, and 34 distinguish over the Carden, Martin, and Petersen references for the reasons set forth above with respect to independent claim 1.

Claims 2 - 16, and 35 - 36 all depend directly or indirectly from independent claim 1 and 34, respectively. Accordingly, applicants respectfully submit that claims 2 - 16 and 34 - 35 distinguish over the Carden, Martin, and Petersen references for the reasons set forth above with respect to independent claim 1.

Applicants believe that the foregoing amendments place the application in condition for allowance, and a favorable action is respectfully requested. If for any

reason the Examiner finds the application other than in condition for allowance, the Examiner is requested to call either of the undersigned attorneys at the Los Angeles telephone number (213) 488-7100 to discuss the steps necessary for placing the application in condition for allowance should the Examiner believe that such a telephone conference would advance prosecution of the application.

Respectfully submitted,

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APPENDIX
VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE CLAIMS:

Please amend claims 6, 9, 13, 17, and 18 as follows. Please cancel claims 19 - 33, without prejudice. Please add new claims 34 - 36.

6. (Amended) The radiation source according to claim 5, wherein the activity density of each of said at least two layers is [substantially] the same.

9. (Amended) The radiation source according to claim 8, wherein [the] a color of a portion of said radioactive deposit corresponds to the activity level of said portion of said radioactive deposit.

13. (Amended) The radiation source according to claim 1, said outer housing configured to be opened by [the] removal of said fastener.

17. (Amended) A radiation source for calibration of nuclear imaging equipment, said radiation source comprising:

an outer housing having a fastener, said outer housing configured to be opened;

a flexible substrate removably contained within said outer housing, said substrate having a front surface; and

a radioactive deposit fixedly deposited upon said front surface, said radioactive deposit having a radioisotope, a binding agent, and a colorant, wherein

at least a portion of said radioactive deposit has at least two layers[, each layer having substantially the same activity density], and

[the] a color of a second portion of said radioactive deposit indicates [the] an

activity level of said second portion of said radioactive deposit.

18. (Amended) A radiation flood source for calibration of nuclear imaging equipment, said radiation source comprising:

an outer housing having a fastener, said outer housing configured to be opened;

a flexible substrate removably contained within said outer housing, said substrate having a front surface;

a radioactive deposit fixedly deposited upon said front surface, said radioactive deposit having a radioisotope, and a colorant; and

a sealing layer covering said radioactive deposit and said front surface of said substrate, wherein

at least a portion of said radioactive deposit has at least two layers[, each layer having substantially the same activity density], and

[the] a color of a second portion of a radioactive deposit indicates [the] an activity level of said second portion of said radioactive deposit.

34. (New) A nuclear imaging system, comprising:

a piece of nuclear imaging equipment to be calibrated; and

a radiation flood source to calibrate the piece of nuclear imaging equipment including,

an outer housing having a fastener, said outer housing configured to be opened,

a substrate removably contained within said outer housing, said substrate

having a front surface; and

a radioactive deposit fixedly deposited upon said front surface, said radioactive deposit having a radioisotope.

35. (New) The nuclear imaging system of claim 34, further including a second substrate with a second radioactive deposit deposited thereon, said second substrate being contained within said outer housing.

36. (New) The nuclear imaging system of claim 34, wherein the combination of said radioactive deposit and said second radioactive deposit produces a desired radioactive result.